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THE HEINZ STEINITZ MARINE BIOLOGICAL LABORATORY
THE HEBREW UNIVERSITY OF JERUSALEM, EILAT, ISRAEL

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EILAT, ISRAEL

Introduction

Ten years ago the author visited Israel and reported on the status of marine biology and on the proposed new Marine Biological Laboratory planned for construction on the Red Sea (ONRL Technical Report ONRL-32-63). The present report will be limited primarily to a brief history and a consideration of the present status of the Laboratory at Eilat where the author spent a period of time during December 1972 as a visiting investigator.

Marine biological research in Israel has been active for many years. The first research programs began on the Mediterranean coast in 1924 and the first laboratory was built at Haifa in 1947 (Sea Fisheries Research Station). Immediately after the establishment of the State of Israel, biologists from the Hebrew University of Jerusalem and later from Tel Aviv University began visiting Israel's Red Sea coast at Eilat. Since the 1950's, the Gulf of Eilat (Gulf of Aqaba) has been investigated with ever increasing efforts. Expeditions from various universities found the Gulf a very rich and fascinating area biologically.

Up to 1956 the Gulf of Eilat was closed to Israeli shipping and, except for a few kilometers of shoreline at the north end of the Gulf, was inaccessible to Israeli scientists. During the fall of 1956 (during the Suez crisis) the Israeli army briefly occupied the Sinai Peninsula, and during this short period of occupation a group of Israeli scientists carried out a remarkable ecological expedition along the entire western coast of the Gulf of Eilat, Tiran, the Sanaphir Islands and around the tip of the Sinai Peninsula up to Tor on the Gulf of Suez. In a period of three weeks they learned a great deal about this previously unexplored region, and the results of the expedition have been published as papers in the Bulletin of the Sea Fisheries Research Station at Haifa. From 1956 until the Six Day War of 1967 the Gulf was open to Israeli ships, and several investigations were carried out in the Gulf and in the Red Sea. Since 1967 Israel has occupied the Sinai Peninsula so the entire west coast of the Gulf of Eilat and the east coast of the Gulf of Suez plus the Red Sea proper is accessible for study.

Features of the Gulf of Eilat and the Red Sea

The Red Sea is unique in several respects. Most important, it is the only major sea that has warm water at very great depths with a temperature of 21°C down to depths of 2,600 m, and even warmer and very salty water in

certain deep depressions. The mouth of the Red Sea is crossed by a shallow sill with water only 100 m deep. This sill at Bab-el-Mandeb effectively excludes cold Antarctic waters which lie at the bottom of the Indian Ocean to the south. The Red Sea is 2350 km long, 250 km in average width and has a mean depth of 558 m and a maximum depth of 2,600 m. It is thus the deepest trough relative to its length in existence.

The Gulf of Eilat, which is a northerly continuation of the Red Sea along the Great Rift, is virtually a miniature of the Red Sea. The Gulf is connected to the Red Sea proper through the Straits of Tiran which have a narrow central channel only 300 m wide and a sill at 250 m depth. Thus the waters of the Gulf are practically a closed system.

The physical oceanography of the Gulf is still poorly known. Biological oceanography in Israel is still considerably ahead of geological, chemical and physical oceanography. Counterclockwise surface currents have been detected at the head of the Gulf, and because of the almost completely unidirectional winds from the north, there is a southerly flowing surface current and a northerly flowing deep countercurrent. This results in upwelling at the northern end of the Gulf.

The Gulf has practically no shelf and the depth drops off precipitously. The 200 m isobath is but 1 to 4 km offshore in the Gulf compared to 11 to 23 km for the Mediterranean shore of Israel. The maximum depth is 1,800 m.

The water of the Gulf of Eilat is always warm and never drops below 21°C, even at great depth. Salinity exceeds 41‰ at all depths. The tide is semidiurnal with an average range of 0.7 m and a spring tide range of 1.2 m. Occasionally, with strong northerly winds, the tide may drop to very low levels exposing the coral reefs along the northern shore.

The fauna and flora of the Gulf of Eilat are still poorly known, but both Israeli and foreign visiting biologists are constantly adding to the knowledge of the area. Intertidal communities are very impoverished, for environmental conditions in this zone are harsh. The animals and plants during low tide are exposed to a very detrimental set of factors -- high daytime temperatures, extreme insolation values, very low air humidity, high wind velocity and record evaporation rates. The nature of the shore-line varies from place to place along the Gulf. Some areas have fine sandy beaches; others have rocky shores made up of red sandstone conglomerate or granite. At Eilat the shore is mainly pebbly with outcrops of conglomerate. The bottom of the Gulf is covered with sediment dominated by pteropod ooze.

In the shallow water along the shore of the Gulf there are extensive reefs of hermatipic corals. These reefs are well-developed in the southern part of the Gulf and in the Red Sea proper, but in the north at Eilat the reefs approach the extremity of their range. Off the Marine Biological Laboratory the coral growth is about as extensive as off Oahu in Hawaii. These reefs, nonetheless, support a remarkably complex and diverse fauna and flora that is actively being studied by scientists from all over the world.

The Marine Biological Laboratory

For many years there was no permanent research laboratory on the Gulf of Eilat and scientists had to work under rather primitive conditions. In the late 1950's Professor H. Steinitz (Hebrew University of Jerusalem), in cooperation with other Israeli scientists from Tel Aviv University and the Sea Fisheries Research Station in Haifa, proposed that a marine laboratory be built at Eilat. After several years of planning the Marine Biological Laboratory was established by the Hebrew University, with the support of the National Council for Research and Development, as a national and international research and advanced teaching facility in marine biology and related fields. The aim of MBL, which was opened in 1968, is to promote knowledge of the living world of the Red Sea. The present laboratory is considered to be the first stage in the establishment of a multidisciplinary Red Sea research facility. The laboratory is open to marine scientists from all nations.

The town of Eilat (at 29°N) was founded in 1950 and now has a population of over 13,000. It is an important port for Israel and has extensive facilities for receiving oil from tankers and pumping it to the Mediterranean coast through pipelines traversing the Negev. The climate is arid with a mean annual rainfall of 22 mm. The town is developing into a tourist resort with many new hotels and many more under construction.

The Heinz Steinitz Marine Biological Laboratory (recently renamed in honor of its founder and first director who died a year ago) is situated 7 km southwest of Eilat on the shore of the Gulf and adjacent to the extensive Coral Reef Nature Reserve that has been established by the State of Israel as a completely protected underwater preserve (Figure 1). The Laboratory presently consists of one main two-story building and several separate shop and aquaria buildings. The net laboratory working space is 180 m^2 with bench space for approximately twelve investigators (Figure 2 presents a plan of the main upper floor of the Laboratory). In addition to the laboratories there is a small library, a dark room, two incubator rooms, a constant low-temperature room, administrative spaces and a small kitchen. Running sea water and aquaria are available in most of the working spaces. Extensive outdoor tanks and aquaria (under shelter) give added space and a new aquarium room with controlled lighting is being prepared. The Laboratory has a motor launch (the Nitzan) that is 9 m long and is used for offshore work. It has a cruising speed of 9 knots and has an echo-sounder and power winch. Routine collecting and sampling gear are also available.

In addition to research done at Eilat, the Marine Biological Laboratory, being a facility of the Faculty of Science, Hebrew University, is used as a base for teaching advanced courses in marine science. During the winter of 1965/66, before the laboratory itself was opened, an International Course in Tropical Marine Biology was conducted at Eilat. A group of twelve doctoral and post-doctoral biologists--members of MAMBO (Mediterranean Association of Marine Biology and Oceanology)---were instructed in ecology, distribution, and taxonomy by Israeli and foreign faculty members. Students from France, Italy, Spain, Germany, Yugoslavia, and Israel attended. Since then periodic courses sponsored by MAMBO have been held at the Laboratory.

Lack of proper classroom space and student laboratories are a distinct disadvantage to these programs.

Staff

The present scientific staff at MBL consists of the following from the Hebrew University:

Director - Professor F. D. Por
Deputy Director - Dr. M. Tsurnamal
Scientific Director (visiting) - Dr. R. Eisler
Resident Scientist - Mr. I. Karpus

Of these, both Por and Tsurnamal are not permanently at Eilat but are based at the University in Jerusalem.

In addition to the University personnel, several scientists from the Israel Oceanographic and Limnological Research Corporation (see below) also occupy space and do work at MBL. At present these biologists and their research interests are:

Mr. Hillel Gordin - Primary productivity
Dr. George Kissil - Fisheries biology; mariculture
Mr. L. Hughes-Games - Pearl Culture

The scientific staff is supported by numerous technicians and helpers. Mr. Amos Ofer is the Resident Administrator and directs several full-time and other part-time employees such as a maintenance man, boat captain, engineering technician, gardener and secretary. Under the scientific director there is a fish collector, laboratory technician, diving technician, and librarian. In all, in December 1972, there were a total of 17 people (in addition to visitors) working at MBL.

The research interests of the scientific personnel are diverse. Por was recently named Director of MBL after Steinitz died. Por has long been associated with studies in the Gulf of Eilat and the Red Sea. He has had a special interest in the crustacea of solar ponds and lagoons. A few of his recent publications are as follows:

Por, F. D.

1969. Limnology of the heliothermal Solar Lake on the coast of Sinai (Gulf of Eilat). Verh. Internat. Verein. Limnol. 17:1031-1034.

1971. One hundred years of the Suez Canal--a century of Lessepian migration: retrospect and viewpoints. Syst. Zool. 20: 138-159.

1972. Hydrobiological notes on the high-salinity waters of the Sinai peninsula. Marine Biology 14:111-119.

Tsurnamal is a specialist on decapod biology and systematics. He has published recently (with Karpus) on a symbiotic relationship between fish and shrimp (see below).

Eisler is an American on leave from the US Environmental Protection Agency, National Marine Water Quality Laboratory, West Kingston, Rhode Island. He has published extensively on the effects of various metals, soaps and detergents on fishes and other marine organisms. He is acting as the Scientific Director of MBL and has a vigorous research program going on the influence of oil pollution on the marine animals of the Gulf of Eilat. Eilat is a major oil port with a fragile coral reef (and its complex biota) in the immediate vicinity of the discharge points, so this is a very appropriate research area for a marine toxicologist. He has had built some very large polyethylene tanks 1 m in diameter and over 2 m high with a viewing window up one side of each tank. In these he plans to study the influence of oil and petroleum fractions on some of the larger invertebrates and fishes of the Gulf.

Mr. I. Karpus, the Resident Scientist, is completing his PhD at the Hebrew University. He is interested in the associative behavior of shrimps and fishes. His most recent publication is:

Karpus, I., R. Szlep and H. Tsurnamal

1972. Associative behavior of the fish Cryptocentrus cryptocentrus (Gobiidae) and the pistol shrimp Alpheus djiboutensis (Alpheidae) in artificial burrows. Marine Biology 15:95-104.

In Israel, as elsewhere, financial support for scientific research (at least in biological oceanography) is declining. When the Marine Biological Laboratory was officially opened in 1968 it was supposed to be only the first building of a large multipurpose Marine Station whose aim was to explore the Red Sea and to contribute to the knowledge of its nature from all aspects. Extensive plans were drawn up, with Hebrew University approval, for a complex facility to be called the Israel Red Sea Oceanographic Research Institute. In addition to the present MBL this Institute would include several new laboratories for chemical and geological studies, classrooms and teaching laboratories, docks for research vessels, a large public aquarium, and student and staff dormitory facilities. All of this to be located on the extensive site now owned by the Hebrew University surrounding the present Laboratory. But since these plans were prepared and approved, money has become scarce, and just this past year Por's request that at least the classrooms be built soon was turned down. It appears, however, that the public aquarium will be built during the next few years, but with private funds. The outlook for the planned Institute is tenuous at the present time.

The present facility at Eilat is primarily a field station for the University. Not all of the staff want to exchange the life in Jerusalem for that in Eilat, and MBL suffers the usual ills associated with an absentee directorship. For the biologist interested in the natural history of a relatively unexplored tropical marine environment, however, Eilat is a marvellous place to work. There is ample equipment for field natural

history and behavioral studies, but little in the way of sophisticated instrumentation. For the visiting scientists requiring specialized gear or equipment, he had best bring it with him, for even if the laboratory could order the instrument, the time lag for delivery could make it difficult for the short-term visitor.

Visitors wishing to use the facilities of the Laboratory should write to: Director, Marine Biological Laboratory, P.O. Box 469, Eilat, Israel.

The Laboratory does not at present publish a journal, but preliminary research results are published in a Scientific Newsletter of the MBL which appears at irregular intervals.

The Israel Oceanographic and Limnological Research Corporation

Some years ago the State of Israel founded a corporation whose initial aim was to develop expertise in oceanography and ultimately make a profit from this. The Oceanographic and Limnological Research Corporation (or the "company" as it is called in Eilat) is mentioned here briefly, for some of their scientists are based at MBL in Eilat. The author did not visit the headquarters of the Corporation but learned about it from people in Jerusalem and Eilat. The main laboratory of the Corporation is on the waterfront at Haifa and by all accounts is an imposing building. The Director is a former high ranking naval officer and a war hero. Support for the Corporation comes from the Ministry of Development, and from all reports no profit has been shown up to now.

In addition to coastal zone engineering studies and possibilities for mining the sea, the OLRC is studying various applied areas in marine biology. The "company" personnel at the MBL in Eilat are primarily interested in marine mariculture including pearl culture. A cooperative venture between the OLRC and Yugoslavia was recently announced by which Israeli scientists will go to Yugoslavia to establish a breeding farm for grey mullets (Mugil cephalus), a marine fish that can breed in freshwater ponds. An attempt will also be made to breed St. Peters fish (Tilapia galilaea) in Yugoslavia.

The Sea Fisheries Research Station at Haifa (reported on in Technical Report ONRL-32-63) has been absorbed by OLRC, and Dr. Oren, Dr. Ben-Tuvia, and others of the staff of the old Research Station are now part of OLRC. One of the unfortunate results of this absorption is that the very fine journal, Sea Fisheries Research Station Bulletin, and the special series of the Bulletin called Contributions to the Knowledge of the Red Sea are no longer published.

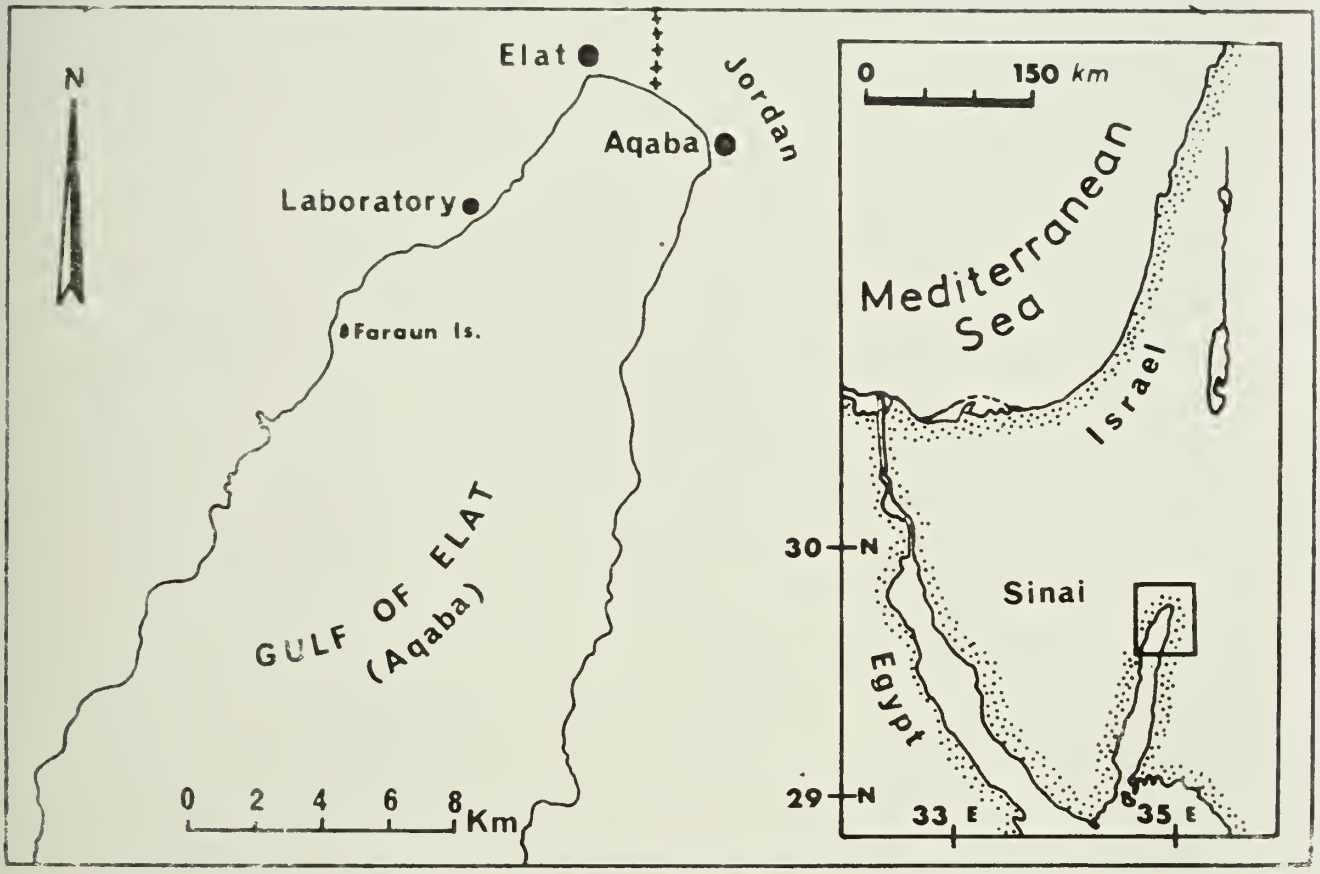
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Figure 1

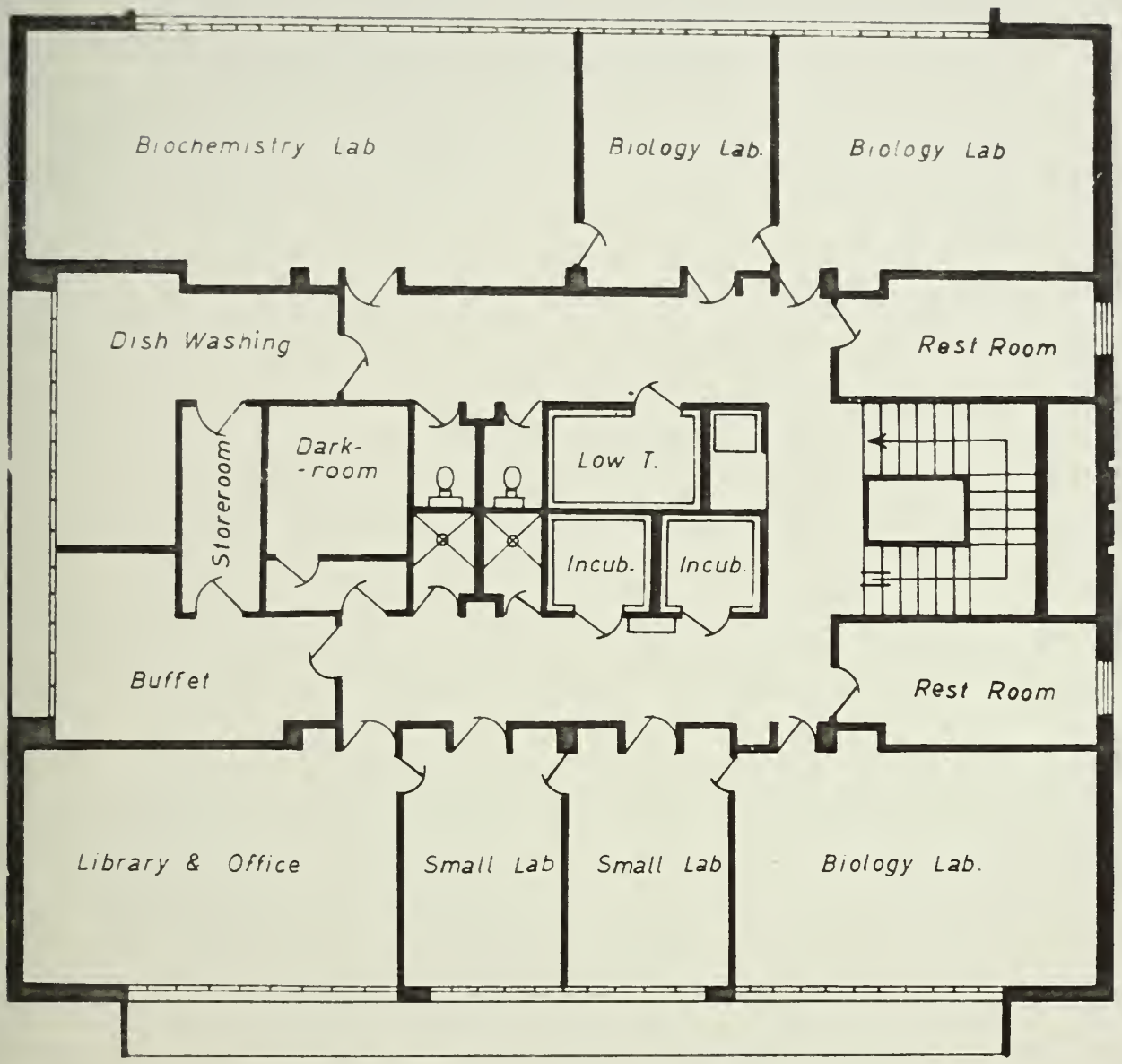

Figure 2 Marine Biological Laboratory, Eilat, Israel

Laboratory Floor Plan

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13 ABSTRACT

This report outlines the history and the physical facilities of the Station, its research and its instructional programs and its personnel. The climate, the bottom topography, and the hydrography - notably the high-salinity water - make the Gulf of Eilat, where the Station is located, a uniquely interesting place to study tropical oceanography and marine biology. Regrettably, financial report support for the Station is waning. Guest scientists are welcome, but the author would caution them that equipment may be in short supply.

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